Prof, Alok Kumar Majumdar of our Centre gets the Prof. R. Srinivason Award

Prof. Alok Kumar Majumdar of our Centre was awarded the prestigious Prof. R. Srinivason Award-2007 for Low Temperature Physics/Cryogenics in view of his sustained contributions to the growth of low temperature physics in the country, especially through the training of very good manpower. Of the significant contributions by Prof. Majumdar quoted in the award nomination is his role in setting up a modern group on magnetic studies of alloys using low temperature magnetic and transport measurements which includes a state-of-art 7 tesla superconducting magnet system with variable temperature insert for magneto-transport and thermoelectrical studies. The group, now recognized in the country as a leading group in this area has brought international recognition as well.

A sample of his contributions are in areas such as:
- Observation of asymmetric scattering in Fe and its dilute alloys
- Magnetoresistance in canonical spin glasses (widely referred in most books on the subject)
- Resistivity minima in several bulk crystalline and amorphous systems interpreted in terms of quantum interference effects
- Compositional phase transition in Fe-Ni-Cr alloys (hotly pursued topic in India and abroad)
- Co-existence of antiferromagnetism and spin-glass phase in CuMn alloys
- Magneto-transport in Giant/Colossal magnetoeresistive thin films
- Anomalous Hall effect in nanomagnetic systems

One of his current researches has been highlighted on Page-2.

The Shyama Prasad Mukherjee fellowship for our student

Rudranil Basu, a post-BSc student in our Centre has been awarded the prestigious Shyama Prasad Mukherjee fellowship by the CSIR this year for carrying out PhD. He had his undergraduate studies in Vivekananda College in the city. He has been a Post-BSc student in our Centre since 2006 and completed the Master’s degree in this course in 2008. Currently he is pursuing his PhD work here in our Centre on: "Aspects of Non-Perturbative Quantization of Gravity as Gauge Theory" under the guidance of Dr Samir Kumar Paul. He has already communicated a couple of research papers under the title: (1) 2+1 Quantum Gravity with Barbero-Immirzi like parameter on Toric Spatial Foliation, Rudranil Basu and Samir K Paul arXiv:0909.4238 gr-qc.(2) Entropy of Isolated Horizons revisited, Rudranil Basu, Ramesh K Kaul and Parthasarathi Majumdar arXiv: 0907.0846v2 gr-qc
Retirement of Prof. Nilakantha Nayak

Professor Nilakantha Nayak retired from the Centre on 31st July. Prof. Nayak’s field of expertise is Quantum Optics. He has worked on several areas in this field ranging from cavity-QED, to laser physics and nonlinear optics. He has authored a number of papers and review articles on various aspects of this subject such as on atomic coherent states and spin squeezing, dissipative interactions in micromaser dynamics, two- and three-level Rydberg atoms interacting with micro-cavities, multiwave mixing, maser and laser theory, and quantum statistical properties of radiation. During the last few years Prof. Nayak focussed attention on the recently developing applications of quantum information protocols implemented by atom-photon interactions in quantum optical devices. His collaborative work in this area has led to several publications, and this direction is one of the objectives of a DST project entitled “Fundamental aspects of quantum theory and quantum information: a multidisciplinary approach”, that has been recently awarded with Prof. Nayak as one of the Co-PIs and Dr. Archan S. Majumdar as PI. Prof. Nayak has also served the Centre in various administrative capacities, such as Vigilance Officer, and Acting Administrative Officer.

Archan S. Majumdar, Dept. of Astrophysics & Cosmology

Scaling exponent within the side-jump mechanism of Hall effect size dependence in Ni nanocrystals

High-resolution Hall data in only 3.5μg of Ni nanocrystals, grown in a planar array on TiN, are reported. We conclude from the exponent, $n\sim n_0 \pm 0.01$ in $R_x \sim \rho$, where $R_x$ is the extraordinary Hall constant and $\rho$ is the Ohmic resistivity, that the side-jump mechanism could still be operative if the nanocrystals are below a certain critical size and the mean free path of the electrons is strongly temperature dependent only in the magnetic layer. Also, the 1000 times larger value of $R_x$ than those in bulk Ni makes it an ideal candidate for magnetic sensors. A. K. Majumdar, Dept. of Material Sciences

Monte Carlo Simulations of Thermal Comptonization Process in a Two Component Accretion Flow Around a Black Hole

For over quarter of a century, the Monte Carlo simulation has been found to be an essential tool to understand the formation of spectrum in compact bodies. Sunyaev & Titarchuk showed that the power-law component of a black hole spectrum is due to inverse Comptonization. In the present paper, we attempt to solve the problem of spectral properties using a thick accretion disk of toroidal geometry as the Compton cloud which is supposed to be produced by the sub-Keplerian inflow. The outer boundary of the thick accretion disk is treated as the inner edge of the Keplerian disk. One positive aspect in treating the CENBOL in this manner is that the distribution of electron density and temperature can be obtained totally analytically. We compute the effects of thermal Comptonization of soft photons emitted from a Keplerian disk around a black hole by the post-shock region of a sub-Keplerian flow. We show that the spectral state transitions of black hole candidates could be explained either by varying the outer boundary of the CENBOL, which also happens to be the inner edge of the Keplerian disk, or by changing the central density of the CENBOL which is governed by the rate of the sub-Keplerian flow. (Contd to Pg 3)

Brief Items:

Post-Doc offers:
Our students got Post-Doc Fellow position in different Laboratories around the world:

Venkat Kamlakar at Institut de Physique et Chime des Matieriax de Strasbourg, France
Tapati Sarkar at CRISMAT Laboratory. (ENSICAEN), Caen, France
Abhishek Pandey at Ames Laboratories, USA
Roby Cherian Max Planck Institute, Stuttgart, Germany
Shailesh Kulkarni at HRI Allahabad
Manoj Yaadav at Upsala University, Upsala, Sweden

Visitors and Bose Colloqua:
We had distinguished visitor like Prof. Biman Bagchi from IISc, Bangalore. The Bose Colloquia covering topics of wide interest have been delivered by a number of distinguished speakers from various academic Institutions. The speakers include, to name only a few, Prof. Muttalib, University of Florida, Prof. Abhirup Sarkar from ISI, Kolkata, Prof. S. Raha from Bose Institute, Kolkata etc.

New students: The admission to various courses in our Institute is completed. There have been nine students in the Post-BSc integrated Ph. D program in Physical Sciences. Total 24 students joined the Post-MSc PhD program, out of which 9 students have qualified the CSIR-UGC and the remaining ones qualified through the All-India JEST examination.
Monte-Carlo Simulations (From Pg.2),

We confirm the conclusions of the previous theoretical studies that the interplay between the intensity of the soft photons emitted by the Keplerian flow and the optical depth and electron temperature of the Comptonizing cloud is responsible for the state transitions in a black hole (Himadri Ghosh, Sandip K. Chakrabarti and Philippe Laurent; Accepted for publication in IJMPD, 2009, arXiv:0905.2252).

Himadri Ghosh, Dept. of Astrophysics & Cosmology

Quantum entanglement in a non-commutative system

We explore the effect of two-dimensional position-space noncommutativity on the bipartite entanglement of continuous-variable systems. We first extend the standard symplectic framework for studying entanglement of Gaussian states of commutative systems to the case of noncommutative systems residing in two dimensions. Using the positive partial transpose criterion for separability of bipartite states, we derive a condition on the separability of a noncommutative system that is dependent on the noncommutative parameter θ. We then consider the specific example of a bipartite Gaussian state and show the quantitative reduction in entanglement originating from noncommutative dynamics. We show that such a reduction in entanglement for a noncommutative system arising from the modification of the variances of the phase-space variables (uncertainty relations) is clearly manifested between two particles that are separated by small distances. S. Adhikari, B. Chakraborty, A. S. Majumdar, and S. Vaidya, Phys. Rev. A. 79, 042109 (2009).

S. Adhikari, Dept. of Theoretical Sciences

The Total Solar Eclipse

On Wednesday, 2009 July 22, a total solar eclipse was visible from within a narrow corridor that traversed half of Earth shown in the following Figure. The path of the Moon’s umbral shadow began in India and crossed through Nepal, Bangladesh, Bhutan, Myanmar and China. After leaving mainland Asia, the path crossed Japan’s Ryukyu Islands and curves southeast through the Pacific Ocean where the maximum duration of totality reached 6 min 39 s with the maximum eclipse occurring in the ocean at 02:35:21 UTC about 100 km south of the Bonin Islands, southeast of Japan. A partial eclipse was seen within the much broader path of the Moon’s penumbral shadow, which included most of eastern Asia, Indonesia, and the Pacific Ocean.

This solar eclipse was the longest total solar eclipse to occur in the 21st century, and will not be surpassed in duration until 13 June, 2132. At this day of eclipse we were at Khagrabari in Coochbehar (26°20'17.81'' N, 89°26'50.17'' E ) of West Bengal. The eclipse started here from early morning 05:28 hrs to 07:40 hrs (IST). The total solar eclipse lasted nearly four minutes — from 6.26 am to 6.30 am — at Coochbehar and the sun was not visible at all. The sky was mostly cloudy while eclipse started. The sky got partly clear at total solar eclipse time. The sun was visible with a faint cloud layer in front of it during third & fourth contact of eclipse. Diamond Ring was almost clearly visible from Coochbehar. I took some pictures which are given below.

Kinsuk Giri, Dept. of Astrophysics & Cosmology

Report for 2nd ICFSMA, 2009

The conference, second in the series of International Conference on Ferromagnetic Shape Memory Alloys, took place in Spain this year. It was held in the Universidad del Pais Vasco, Basque Country, Bilbao, from July 1 to 3. It may be recalled that the first of the series, the 1st ICFSMA 2007 conference was conceived and held here in our Centre, in November 2007. In the conference, apart from major reports on the archetypal Ni$_2$MnGa and its derivative systems, there were also reports on other alloys with interesting properties. Some demonstrations were also given by different Companies making smart material products. The conference ended with a resolve to hold the next, i.e. the 3rd ICFSMA conference in Dresden in Germany in 2011. In addition, publicly we (the organizing members of the 1st conference) were thanked by the present (2009) and future (2011) organizing committee members for starting a successful series.

P. K. Mukhopadhyay, Dept. of Material Sciences
The Summit
Made it at last!
Roping and roping up
Peering through puzzles
And now the touch of the peak
Weary warm feet
Sweet sweating!
The past is but a mist
The tears
The tearing tiring trials
The failed, fallen face!
Yet trying
Trying was living
Living lonely
Only with the aim
Grueling in the dark
For a dot of delight
Seldom achieved!
Hi! My mother
Past is not a mist
Bearing the pains
Not in vain!
Oh! No, no!
No more tear
My dear!
Sunish Kumar Deb,
Administration

Arctic tern
Finland is a country of adventuring, hiking, canoeing, sailing etc. There are about 350 breeding bird species in Finland. Here is an arctic tern, tempting the juvenile one sitting on mast to fish for itself. Mam is bringing the fish close to the juvenile’s beak and flying away again and again. Great drama and great dynamics

Prosenjit Singha Deo, Dept. of Chemical, Biological & Macromolecular Sciences

Brief News:
1. The Centre has tried to enhance the capabilities of its administrative employees by encouraging them to attend various training programmes and workshops, namely the Administrative Vigilance held at the Institute of Secretarial Training and Management in New Delhi during 24-28 August, 2009.
2. A number of staff members successfully completed ‘Pragya’ and ‘Praveen’ examinations of the Department of Officially Language, Govt. of India in May 2009.
3. The Centre has installed 1 no. 500 KVA Silent type Diesel Generator Set (D6 Set) for uninterrupted supply of power at the time of load-shading and 1 no. new 630 KVA Dry type Transformer to cope up with the electricity need as the Centre is in infrastructural development stage.